

a first substrate;

a reflective layer formed on the first substrate; and

a color filter layer formed on the reflective layer,

wherein the color filter layer is formed inside a sealing material in a region which includes at least an effective display area and a margin area which is outside the effective display area and which is part of a visible area, the color filter layer is configured such that light impinging on the color filter substrate in all areas in which the color filter layer is disposed is transmitted through the color filter substrate.

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11. (New) A reflective liquid crystal display comprising a color filter substrate according to Claim 1, wherein layers of the color filter substrate are electrically isolated from layers of a second substrate opposing the color filter substrate.

12. (New) A reflective liquid crystal display comprising a color filter substrate according to Claim 1, wherein the color filter layer is formed directly on the reflective layer.

13. (New) A reflective liquid crystal display comprising a color filter substrate according to Claim 6, wherein spherical spacers separate the color filter substrate and the second substrate.

## Remarks

### Summary

Claims 1-10 were pending. Claim 1 has been rewritten and Claims 11-13 added. No new matter has been added as a result of this amendment. Claims 1-13 are pending after entry of this amendment.

### Objection to Drawings

In the Office Action of September 4, 2002, Figures 5 and 6 were objected to as not being designated by a legend such as --Prior Art-- because only that which is old is illustrated. Applicants submitted a corrected version of Figs. 5 and 6 with corrections marked in red in the Preliminary Amendment submitted on December 6, 2000 and requested that the Examiner approve the corrections. Applicants enclose

a copy of the Preliminary Amendment for the Examiner's convenience. Applicants herein resubmit the corrected drawings and again request that the Examiner approve the corrections. Applicants will submit formal drawings upon receiving Notice of Allowance.

### **Rejection of Claims**

In the Office Action of September 4, 2002, Claims 1-10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of Miyazaki (U.S. Patent 5,978,061). Applicants have amended Claim 1, added new Claims 11-13, and submit that pending Claims 1-13 overcome the rejection.

Amended Claim 1 recites a color filter substrate that comprises a first substrate, a reflective layer formed on the first substrate, and a color filter layer formed on the reflective layer. The color filter substrate has a visible area that contains an effective display area and a margin area which is outside the effective display area. The color filter layer is formed inside a sealing material in a region which includes the effective display and margin areas. The color filter layer is configured such that light impinging on the color filter substrate in all areas in which the color filter layer is disposed is transmitted through the color filter substrate.

Such a configuration avoids one of the disadvantages of prior reflective liquid crystal displays that contain a light shielding layer, that is, when the background light is low, the reflective liquid crystal display becomes dim and hard for the user to see. In the arrangement of Claim 1, to the contrary, light that impinges on the color filter substrate in an area in which the color filter layer is disposed is transmitted through the color filter substrate, thereby permitting the display to be sufficiently visible even under conditions of low luminescence.

Another disadvantage of prior reflective liquid crystal displays (and illustrated in AAPA) is that when the light shielding layer is eliminated, the color filter layer is formed only in the effective display area as the visibility of the effective display area is enhanced when the margin area appear black or close to black. The elimination of the light shielding layer causes light transmitted through the substrate and reflected at the reflective layer in the margin area to be directly emitted to towards the user resulting in color irregularities and impairment of visibility of the effective display area. In addition, a step is formed at the border between the effective display and

margin areas. This step causes the thickness of the liquid crystal cells to become irregular, impairing the display characteristics and resulting in degraded display. For example, the brightness and electro-optical characteristics vary resulting in degraded contrast or color irregularities occur in the display. By configuring the color filter layer such that light impinging on the color filter substrate in all areas in which the color filter layer is disposed is transmitted through the color filter substrate, the amount of light reflected from the margin area is reduced and providing uniform thickness of the liquid crystal cells without causing degradation in the optical characteristics, thereby promoting visibility of the display in low background lighting conditions.

Neither AAPA nor Miyazaki anticipate or suggest an arrangement in which light impinging on the color filter substrate in all areas in which the color filter layer is disposed is transmitted through the color filter substrate. Miyazaki in fact expressly teaches away from such an arrangement, specifically teaching the use of a light shielding layer between the color filter layer and the substrate. Furthermore, as AAPA teaches the undesirability of using a light shielding layer due to the inability to view the display in low background conditions, Miyazaki teaches away from AAPA as well. Furthermore, Miyazaki is directed to an entirely different structure from that of AAPA. AAPA recites that a reflective layer is formed on the first substrate and a color filter layer is formed on the reflective layer. Miyazaki, on the other hand, is not directed towards a reflective liquid crystal display. Nor does motivation exist to alter the structure of Miyazaki to form incorporate a reflective layer and form a reflective liquid crystal display. Thus, Applicants submit that no motivation exists to combine Applicants' admitted prior art with that of Miyazaki.

For at least these reasons, neither AAPA nor Miyazaki, alone or in combination, anticipate or suggest the arrangement of amended Claim 1. Thus, amended Claim 1 and Claims 2-13 are patentable over the prior art cited by the Examiner.

In addition, Claims 11-13 are independently patentable over the prior art cited by the Examiner. Claim 11 recites that layers of the color filter substrate are electrically isolated from layers of a second substrate opposing the color filter substrate. This is entirely different from Miyazaki, who teaches electrical connection between common electrodes of the color filter substrate and substrate opposing the color filter substrate to decrease the number of fabrication steps and thus cost.

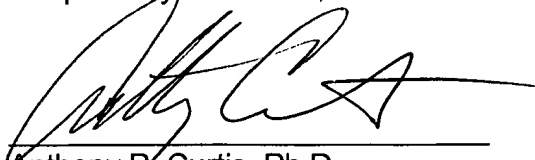
Claim 12 recites that the color filter layer is formed directly on the reflective layer. Miyazaki does not anticipate or suggest such an arrangement. In fact, in Miyazaki, the color filter layer is disposed directly on the light shielding layer or directly on the substrate. Nor does any motivation exist to insert a reflective layer beneath the color filter layer. Claim 13 recites the use of spherical spacers. Miyazaki does not anticipate or suggest spherical spacers. The spacers in Miyazaki are specifically pillar-shaped because they are formed by stacking the color filters. Thus, the spacers in Miyazaki cannot be spherical. Not only does Miyazaki teach away from the arrangement in each of Claims 11-13, but in addition, each provides an additional motivation against combining Miyazaki with AAPA.

For at least these reasons, neither AAPA nor Miyazaki, alone or in combination, anticipate or suggest the arrangements of new Claims 11-13. Thus, new Claims 11-13 are patentable over the prior art cited by the Examiner.

## **Conclusion**

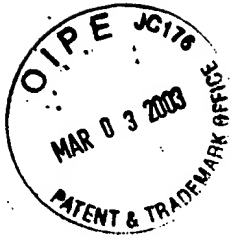
In view of the amendments and arguments above, Applicants respectfully submit that all of the pending claims are in condition for allowance and seek an early allowance thereof. If for any reason the Examiner is unable to allow the application in the next Office Action and believes that a telephone interview would be helpful to resolve any remaining issues, he is respectfully requested to contact the undersigned.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Anthony P. Curtis', written over a horizontal line.

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**Appendix A**  
**Serial No. 09/799,168**  
**Vehicle Air Conditioning Apparatus**  
**Kazuyuki Murakami**

**In the Claims:**

Please amend Claim 1 as follows:

1. (Twice Amended) A color filter substrate for use in a reflective liquid crystal display, the color filter substrate comprising:
  - a first substrate;
  - a reflective layer formed on the first substrate; and
  - a color filter layer formed on the reflective layer,wherein the color filter layer is formed inside ~~the~~ a sealing material in a region which includes at least an effective display area and a margin area which is outside the effective display area and which is part of a visible area, the color filter layer is configured such that light impinging on the color filter substrate in all areas in which the color filter layer is disposed is transmitted through the color filter substrate.

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